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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,556	03/12/2004	Hiromasa Sato	250241US3CONT	6465

22850 7590 11/19/2004

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EXAMINER

CHANG, AUDREY Y

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 11/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/798,556

Applicant(s)

SATO ET AL.

Examiner

Audrey Y. Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 8-11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/12/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/12/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election **without traverse** of claims 1-7 (Species A) in the reply filed on **September 20, 2004** is acknowledged.
2. Claims 8-11 are **withdrawn** from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without traverse** in the reply filed on September 20, 2004.
3. Claims 1-7 remain pending in this application.

Claim Objections

4. **Claims 2-7 objected to because of the following informalities:**

(1). The phrase "the *external* light diffracted by said incoming-side diffraction grating" recited in claim 2 is confusing and indefinite since it is not clear the term "external" is defined with respect to what.

(2). The phrase "the diffraction grating" recited in claims 3 and 4 is confusing since it is not clear which diffraction grating is referred here. In their based claim (claim 2) at least two diffraction gratings have been claimed.

(3). The phrase "step" and the phrase "another step" recited in claim 7 are confusing since it is not clear if these steps are for the *same* stair and for the same grating or not.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claims 1-3, and 5-6 are rejected under 35 U.S.C. 102(e) as being anticipated by the patent issued Nakanishi et al (PN. 6,728,034).**

Nakanishi et al teaches a *diffraction optical element* that is comprised of a transparent *substrate* (1, Figures 6, 7A, 7B, and 10), wherein on a first *diffraction grating pattern* (4) is formed on the *central* region of the substrate wherein a light incidents (L0), and at least one *second diffraction gratings* (5 and 6, or 9 and 10) formed on the opposite surface, (with respect to the first diffraction grating pattern), of the substrate. Nakanishi et al teaches that the *pitch* of the first diffraction grating pattern is the *same* as the *pitch* of the second diffraction grating pattern, (please see column 3, lines 38-40). Nakanishi et al further teaches that each of the first and second diffraction grating patterns comprises a plurality of *slits* and as demonstrated by the drawings 1-17 and 19A, the slit pattern comprises *concave/convex shape*, (please see columns 3-4, 6, 8, and 10).

With regard to claim 2, Nakanishi et al teaches that the *first* diffraction grating (4, Figure 10) serves as the *incoming-side diffraction grating* wherein the incident light enters the diffraction optical element through it and the *second* diffraction grating patterns (9 and 10) are formed on the *outgoing side surface of the substrate*, such that they serve as the *outgoing side diffraction gratings*. The outgoing side diffraction gratings (9 and 10) are formed on the *light path* of the *diffracted* light from the first or the incoming side diffraction grating. The pitches for the two diffraction gratings are the same, (please see column 3, line 38-40 and column 10, lines 40-52).

With regard to claim 3, the diffraction gratings are formed in the surfaces of the substrate.

With regard to claim 5, Nakanishi et al teaches that the outgoing side diffraction gratings (5 and 6, Figures 6-7B) may also be *reflection* type diffraction gratings.

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With regard to claim 6, Nakanishi et al teaches that the outgoing side diffraction gratings (9 and 10, Figure 10) have a saw-tooth like diffraction grating profile.

With regard to claim 1, Nakanishi et al also teaches that the diffractive optical element is comprised of diffraction grating formed on the surface that is *opposite* to the light incident surface of the substrate, (please see Figure 15).

This reference has therefore anticipated the claims.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. **Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Nakanishi et al (PN. 6,728,034) in view of the patent issued to Perry et al (PN. 5,907,436).**

The diffractive optical element taught by Nakanishi et al as described for claim 1 above has met all the limitations of the claim. Nakanishi et al teaches that the diffraction gratings are formed in the surfaces of the substrate but does not teach explicitly that the diffraction gratings may also be formed in an inorganic film placed on the substrate. However forming diffraction grating in inorganic film such as *dielectric* film and then placing it on a substrate is rather well known in the art as demonstrated by the teachings of Perry et al. Perry et al teaches to form diffraction grating in a dielectric film, (please see Figures 1A, 6, 7E, 9I), wherein together with the dielectric multilayer film the diffraction grating has high efficiency in either transmission mode or reflection mode. It would then have been obvious to one skilled in the art to apply the teachings of Perry et al to modify the diffractive optical element of Nakanishi et al

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to form the diffraction grating in a dielectric film for the benefit of enhancing the transmission or reflection properties of the diffractive optical element.

9. **Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Nakanishi et al in view of the patent issued to Chen et al (PN. 5,914,811).**

The diffractive optical element taught by Nakanishi et al as described for claim 1 above has met all the limitations of the claim. This reference teaches that the outgoing side diffraction gratings may have *saw-tooth like shape* (9 and 10 in Figure 10), however it does not teach explicitly that the diffraction gratings are of *pseudo* saw-tooth like shape that is approximated by multiple stepped stairs. However using multiple stepped stairs structure to *approximate* the desired diffraction grating profile is rather well known in the art for it provides good accuracy for approximating the desired profile. Chen et al in the same filed of endeavor teaches explicitly that a *blazed* grating (i.e. saw-tooth like grating) can be approximated by blazed grooves with M-step stairs, (please see Figures 1 and 2). It would then have been obvious to one skilled in the art to apply the teachings of Chen et al to use M-step stairs structure to approximate the saw-tooth like gratings for the benefit of providing more accurate grating profiles for the diffraction gratings. The feature concerning the step height is confusing and it cannot be examined with details. But in general the step height can be selected and varied to best approximate the grating profile as desired.

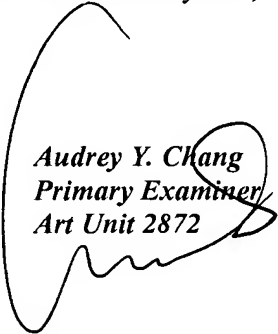
Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Audrey Y. Chang
Primary Examiner
Art Unit 2872

A. Chang, Ph.D.